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Rural Water Supplies in South Dakota : Grant County

Walter V. Searigh
Cooperative Extension Service, South Dakota State College

Elmer E. Meleen
Cooperative Extension Service, South Dakota State College

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Rural Water Supplies in South Dakota

GRANT County

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January, 1940
Special Extension Circular
Number 47

Extension Service
South Dakota State College
Brookings, S. D.

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No. 47
pt. 25

RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

GRANT COUNTY

BY

WALTER V. SEARIGHT

AND

ELMER E. MELEEN

PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION, SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in Depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of Flowing Wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

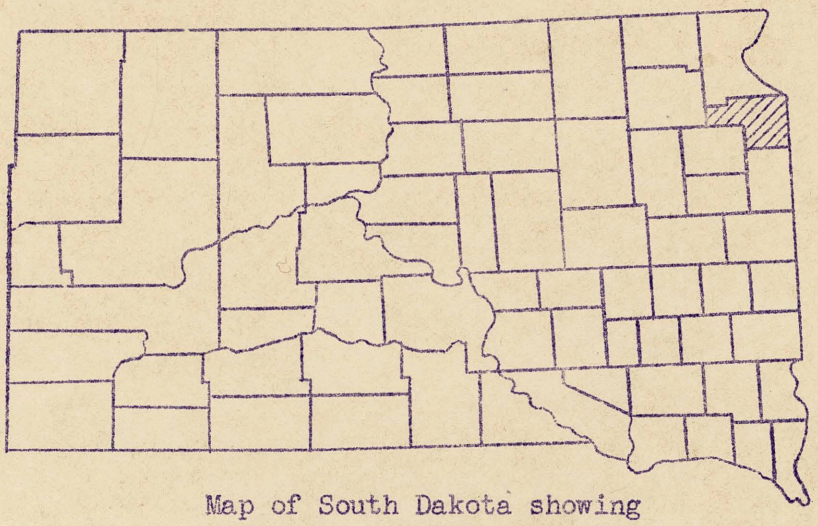
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

GRANT COUNTY

Grant county lies in the northeastern part of South Dakota. It is bounded on the north by Roberts county, and the eastern boundary is shared with Minnesota. On the south it is bounded by Deuel county and on the west by Day and Codington counties.



Map of South Dakota showing location of Grant county

The county is devoted chiefly to agricultural interest with approximately 90 per cent of the area, or 398,040 acres of the total 442,240 acres, in farms. The farmed area is divided into 1442 farm units of approximately 276 acres to each farm unit. More than 75 per cent of the farm acreage is under cultivation. Thus, 67.5 per cent of the total area of the county was cropped. Corn, wheat, oats, rye, barley, hay and flax are the important field crops, the first five being of the most importance. Livestock is also important, with cattle, sheep, hogs, horses and mules being produced in the order named. Dairy products are important but subordinate.*

Because of the importance of livestock and dairy cattle, generally distributed sources of water supply are necessary in Grant county. Supplies required are not great but adequate and constant supplies of suitable water at relatively low cost are required to operate profitably farms of these sizes and organization. In general, water supplies are available and widely dis-

*South Dakota Agricultural Statistics, Annual Report, 1937

tributed, as indicated by the well location map of Grant county.

On the well location map, all flowing wells and all deep pumped wells obtaining water from the Dakota-Lakota sandstones or other sandstones are shown in black as artesian wells. All others are shown in red and are called shallow wells regardless of depth. On all other maps and in the tables all wells 200 feet or less in depth are called shallow wells, and those deeper than 200 feet are called deep wells unless otherwise stated. Most of the artesian wells of the county are included with the deep wells, although some are included among the shallow ones.

DEPTH AND DISTRIBUTION OF WELLS

Most of the rural water supplies of Grant county are obtained from wells of relatively shallow depths, depths 200 feet or less, and are included in the shallow wells in this report except as noted above. Shallow wells are widely distributed over the county, averaging more than one well for each square mile. (See well location map.)

A total of 830 wells, of which 736 were classed as shallow pumped wells, were reported by questionnaires returned by 55 per cent of the recipients of Grant county. The distribution of these wells is shown in table 1 and on the shallow water map. In addition, 41 wells were shallow flowing wells, flowing wells 200 feet or less in depth. (See table 3.) Thus, 93.6 per cent of all the wells reported in the county were shallow, indicating that more than 90 per cent of all of the wells in the county are shallow.

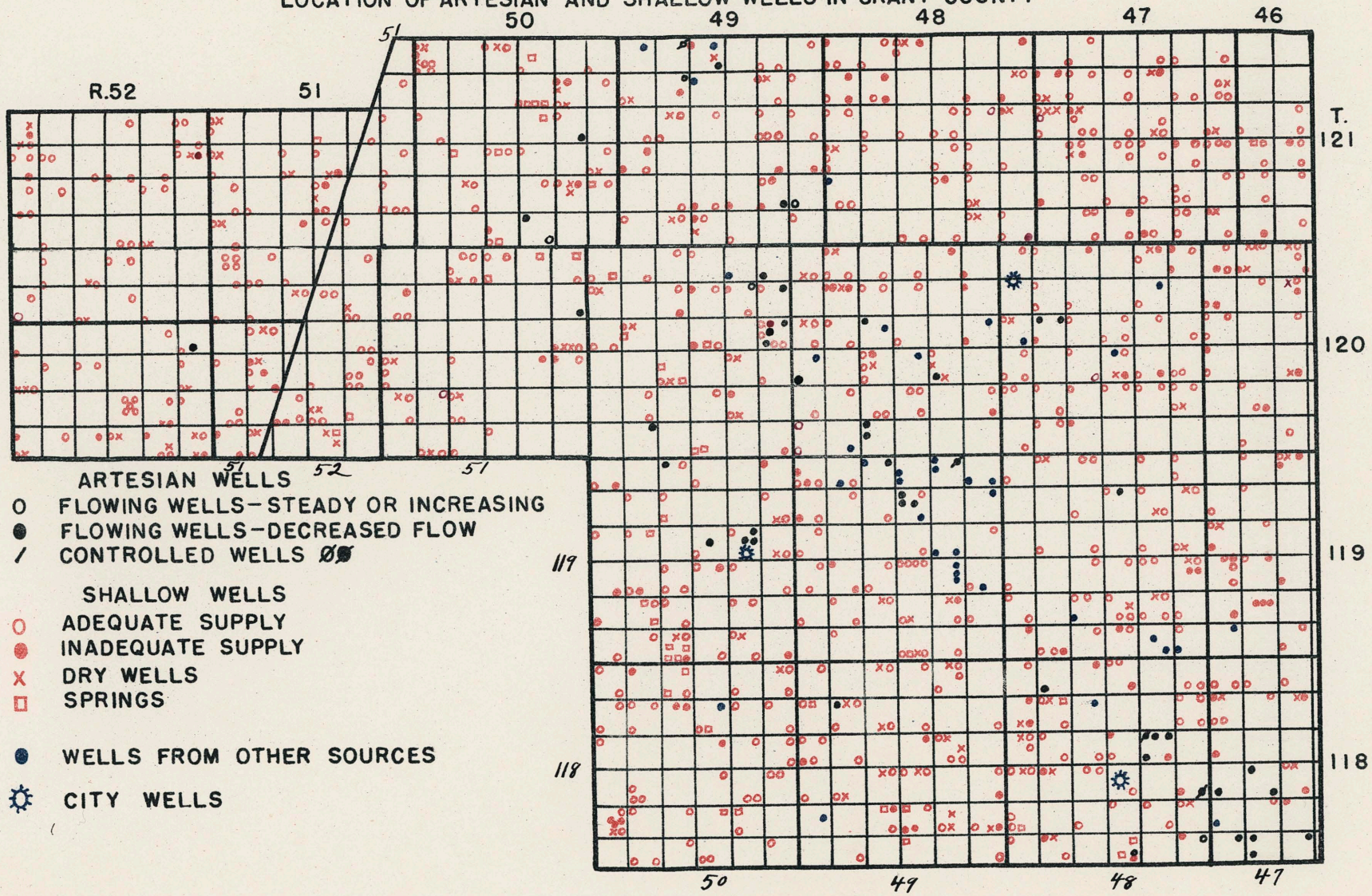
In six townships, all wells reported were shallow. These are listed as follows:

Township	Range	:	Township	Range
118N	47W	:	121N	46W
118	50	:	121	47
119	49	:	120	52 (R)*

Nine townships reported more than 90 per cent, an average of 95.7 per cent, shallow wells. These townships and the percentage of shallow wells in

*Reservation

LOCATION OF ARTESIAN AND SHALLOW WELLS IN GRANT COUNTY



ARTESIAN WELLS

- O FLOWING WELLS—STEADY OR INCREASING
- ● FLOWING WELLS—DECREASED FLOW
- / CONTROLLED WELLS Ø●

SHALLOW WELLS

- O ADEQUATE SUPPLY
- ● INADEQUATE SUPPLY
- X DRY WELLS
- □ SPRINGS

- ● WELLS FROM OTHER SOURCES
- ☼ CITY WELLS

each are listed below:

Twp.	Rge.	Per cent Shallow	Twp.	Rge.	Per cent Shallow	Twp.	Rge.	Per cent Shallow
118N	48W	93.9	119N	48W	95.5	120N	48W	98.
118	49	94.8	119	50	97.7	121	52	92.1
119	47	95.5	120	47	96.	121	52	92.1 (Res.)

Seven townships reported between 80 and 90 per cent of the wells, average 88.9 per cent, to be shallow. These townships are listed as follows:

Twp.	Rge.	Per cent Shallow	Twp.	Rge.	Per cent Shallow
120N	49W	88.9	121N	49W	88.1
120	51	87.1	121	50	84.8
120	52	89.5	121	51	88.9

Only two townships in Grant county report less than 80 per cent of the wells to be shallow and these average 78.5 per cent. These townships are listed as follows:

T.120N., R.50W. - 78.4 per cent T.120N., R.50W. (Res.) - 78.6 per cent

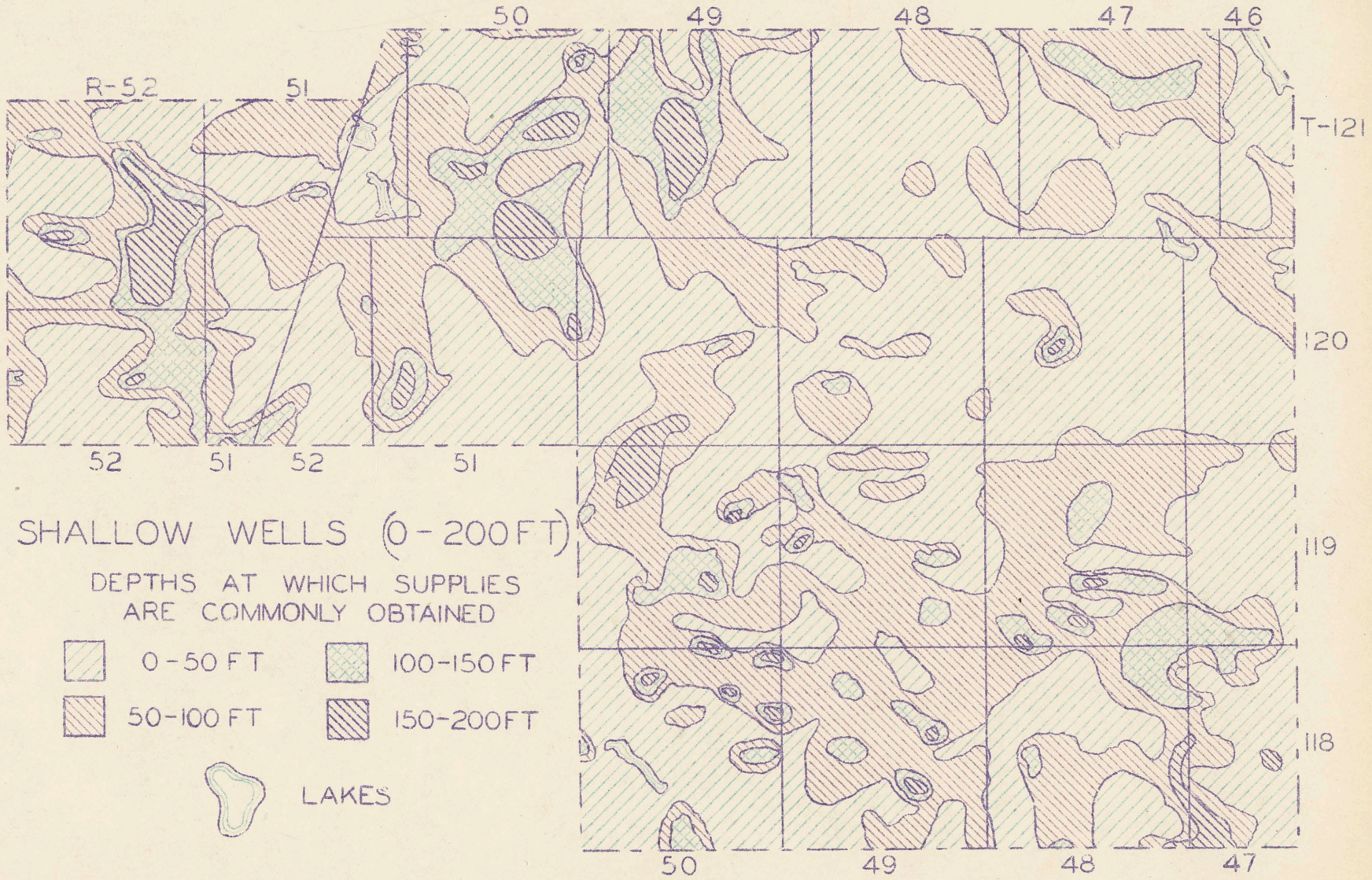
These data show the great importance of shallow water sources in Grant county. They suggest that in cases where deeper supplies are penetrated, choice in many cases at least, is due to necessity.

Of those shallow wells reported more than half (50.8 per cent) are less than 50 feet deep; 31.5 per cent are between 50 and 100 feet in depth. Thus, approximately 82 per cent of all shallow wells reported are 100 feet or less in depth. The shallow wells deeper than 100 feet include 9.5 per cent between 100 and 150 feet and 8.1 per cent between 150 and 200 feet.

On the shallow well map the depth areas of the shallow wells are mapped in 50 foot depth intervals. This map may be used to predict approximate depths required for shallow wells. The accuracy of prediction depends on the accuracy of the map based on the number of wells reported and to greater or less degree on fluctuations of the ground water table.

As stated, some shallow wells are flowing wells. Of these, 14 range between 0 and 50 feet, 11 were between 50 and 100 feet, six were 100 to 150 feet deep and 7 were reported 150 to 200 feet in depth. The shallow flowing wells have been tabulated and are listed as follows by township:

GRANT COUNTY



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MILES
0 2 4 6

Twp.	Rge.	Number Wells	Depth Min.	Depth Max.	Twp.	Rge.	Number Wells	Depth Min.	Depth Max.
118N	47W	7	38	175	120N	49W	4	22	60
118	48	7	46	180	120	50	2	52	135
118	49	1	68		120	51	1	-	-
119	48	1	110		121	49	2	40	48
119	49	5	40	70	121	50	3	180	200
119	50	5	25	170	120	52 (R)	1	100	
120	48	2	20	24					

Deep wells, those 200 feet or more in depth, occur in the north central and northwestern parts of Grant county for the most part, and those more than 400 feet deep are restricted to these areas. A total of 45 deep pumped wells was reported and an additional eight are flowing wells. In the following table, the number of deep wells, both pumped and flowing, are listed together with percentage of deep wells to total wells and minimum and maximum depths:

Twp.	Rge.	Number of Wells	Per cent of Total Wells	Minimum	Maximum
118N	48W	3	6.1	230	250
118	49	2	5.1	230	256
119	47	1	4.5	287	
119	48	2	4.5	215	289
119	50	1	2.3	374	
120	47	1	4.	280	
120	48	1	2.	220	
120	49	5	11.9	327	466
120	50	8	21.6	230	562
120	51	4	12.9	260	455
120	52	2	10.5	325	575
121	48	1	2.	212	
121	49	5	11.9	234	467
121	50	5	15.2	206	372
121	51	1	11.1	300	
120(Res.)	51	3	21.4	250	290
121	51	5	16.1	250	497
121	52	3	7.9	250	296

Flowing wells, both deep and shallow, were reported in approximately the same areas as deep wells. The distribution of these wells and their relation to that of deep pumped wells is indicated on the artesian well map (p.11) and their relation to that of the artesian basin and adjacent counties is shown on the artesian map of South Dakota (p. 12).

Deep flowing wells are tabulated as follows by township:

T.120N., R.49W	1 well	Depth not given	
120 50	4 "	Min. depth 250 ft.	Max. 562 ft.
121 49	3 "	" " 234 "	" 467 "

Reports were made on the volume of flow for 15 wells and the flow varies between 148 gallons per minute and 100 gallons per minute. One reported an increase in flow, one steady, and eleven were reported to have decreased in flow since drilling. Four were reported to be equipped with control valves for regulating and controlling the flow of water.

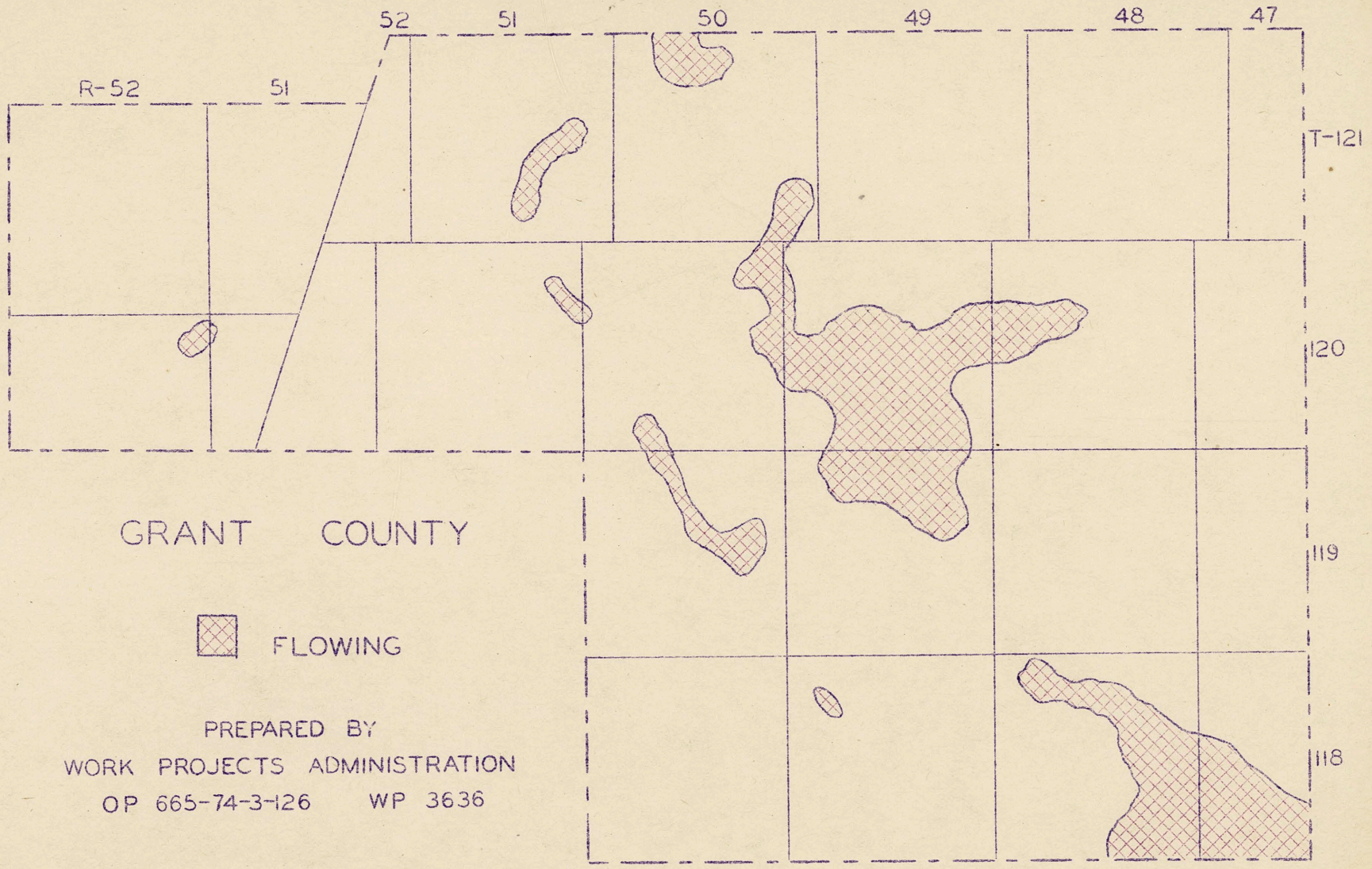
CHARACTER OF WELL WATERS

The general character of well waters of Grant county has been determined from the responses by farmers to questionnaires. On the questionnaires, the farmers were asked whether they considered water supplied by their wells to be hard, medium, or soft. Although most farmers do not have accurate chemical analyses of water supplies on which to base opinions, usage is probably a fairly good criterion of general character and quality, and must suffice until accurate chemical analyses are available.

These data on 777 shallow wells, both flowing and pumped, show that 49.6 per cent were considered to produce hard water, and 46.1 per cent moderately hard. Thus, 95.7 per cent of the shallow well water reported for Grant county was considered to be moderately or definitely hard. This evidence indicates that wells 200 feet or less in depth on which reports were not made and those wells constructed in the future produce and will produce moderately to definitely hard water. Of the wells reported, only 4.3 per cent were considered to produce soft water. These few were scattered over most of the county. None of the shallow flowing wells were reported to produce soft water.

Although most of the shallow well water is hard, most shallow wells produce water suitable for drinking, according to questionnaires. Of the total number of wells reported, only 8.9 per cent (69 wells) were reported unsuitable for drinking purposes. In some cases the unsatisfactory character of the water is possibly due to objectionable dissolved salts which can be determined only by laboratory analysis; in others contamination from surface sources is

ARTESIAN AREAS-1938



GRANT COUNTY

FLOWING

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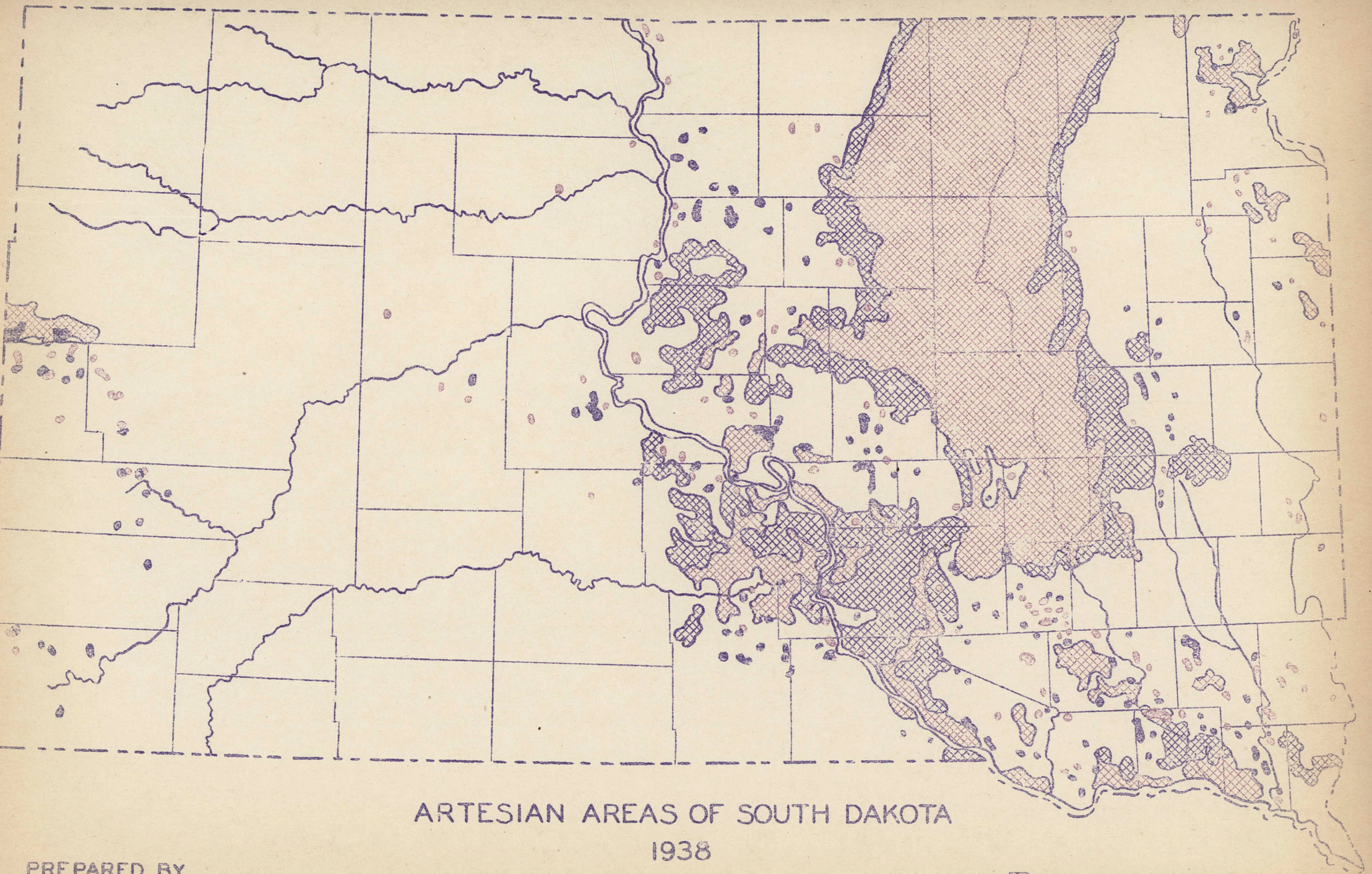

ARTESIAN AREAS OF SOUTH DAKOTA

1938

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FLOWING WELLS

PUMPED ARTESIAN WELLS

possibly responsible. It may be also that some shallow water contain injurious or objectionable ingredients not objectionable to taste which can only be determined by analysis.

Reports on deep pumped wells indicate that a large proportion of these produce moderately to definitely hard water. Of the deep pumped wells reported, 42.8 per cent were reported to produce hard water and 33.3 per cent moderately hard. Thus, more than three fourths, 76.1 per cent, were considered to be moderately to definitely hard and only 23.9 per cent to be soft. It is notable that the percentage of deep wells reported soft is between two and three times as great as that reported for the shallow wells. There is the suggestion that deep wells, on the whole, produce softer water than shallow wells probably because of difference in source.

Shallow flowing wells in Grant county produce hard water according to reports. The deep flowing wells, however, vary considerably in character. Of the eight reported, three were moderately hard and five reported soft. Thus, the flowing deep artesian wells tend to produce soft water rather than hard. This tendency supports the view that the waters from artesian sand, at least, in part, produce soft waters in Grant county.

Flowing wells are reported to furnish water suitable for drinking. It should be noted in this connection that evidence indicates that detrimental chemical compounds such as fluerides are present in deep artesian waters of this area. Laboratory analyses of these rural waters is most desirable.

ADEQUACY OF SUPPLY

In general, the wells of Grant county are considered by the users to be adequate for present needs. Changes in land use and variation of current supply at the source cannot now be predicted, but these are important factors in insurance of adequate future supplies.

Shallow supplies are generally adequate, although more than one fifth (21

per cent) did not supply sufficient water for current farm uses. Inadequacy as reported is not restricted but is generally distributed over the county. One township, however, T.121N., R.51W., reported no inadequate shallow wells. A few townships reported a higher percentage of inadequacy, indicating a probable shortage of supply at the source.

Deep pumped wells appear to be more reliable as sources of adequate supply than shallow wells, since only three of forty five were reported inadequate. Thus inadequacy as reported for deep pumped wells is less than one third that reported for shallow pumped wells.

Of the flowing wells two of the shallow flowing wells and two of the deep flowing wells were reported to furnish water insufficient for present needs.

IRRIGATION

Well waters of Grant county are used to irrigate small garden plots over the county. Twenty eight shallow wells were used to irrigate a total of four acres varying in size from one eighth to one acre. Three deep pumped wells were used to irrigate a total of five eighths of an acre and four flowing wells were used to irrigate a total of seven acres in plots varying in size from one eighth to five acres in size.

DRY HOLES

In Grant county the dry holes are of considerable interest. More than 90 per cent of these are 100 feet or less in depth and more than 60 per cent are less than 50 feet in depth. The following table indicates the percentage depth distribution of these dry holes:

0 to 50 feet	64	61 per cent
50 to 100 "	31	29.5 " "
100 to 150 "	7	6.5 " "
150 to 200 "	1	1. " "
340 "	1	1. " "
484 "	1	1. " "

Twenty eight other dry holes were reported without specified depth.

SUPPLEMENTARY WATER SUPPLIES

Springs and cisterns are important sources of supplementary water supplies in Grant county. Springs are of great importance, particularly in certain localities. The relative abundance of springs is brought out by the following percentages of both springs and wells by townships:

Twp.	Rge.	Springs	Per cent Springs	No. Wells & Springs	Twp.	Rge.	Springs	Per cent Springs	No. Wells & Springs
118N	48W	4	7.5	53	120N	51W	3	7.8	34
118	49	4	9.3	43	120	52	2	9.5	21
118	50	5	10.	50	121	46	1	6.7	15
119	49	1	2.4	42	121	50	10	23.3	43
119	50	8	15.7	51	121	51	1	10.	10
120	50	7	15.9	44	121	51(Res.)	1	3.1	32

These springs furnish water, 90 per cent of which is moderately or definitely hard according to reports. Nineteen of the springs were reported to be 42.1 per cent hard, 47.4 per cent moderately hard and 10.5 per cent soft.

Springs are used chiefly for stock watering purposes, since 17 out of 26 reported use for stock and domestic purposes only.

In areas in which inadequacy of supply exists and where much of the supplies are hard water cisterns form a very important source of supplementary supply. In Grant county, 456 cisterns were reported, approximately one cistern to two wells. There are somewhat fewer than this ratio in the northwestern part of the county, especially in T.120N., R.51W, T.120N., R.52W., T.121N. R.51W.(Res.) and T.121N., R.52W. (Res.) The water is used chiefly for laundry purposes and to supplement inadequate or unsatisfactory supplies.

GRANT COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approximate Acres Irrigated
118	47	14	18	196	75	9	5	-	2	1	9	5	-	-
118	48	39	8	133	45	26	8	1	7	4	28	11	2	1/4
118	49	36	5	200	66	19	13	1	9	8	29	7	-	-
118	50	45	10	172	57	13	22	3	5	7	38	7	2	1/4
119	47	21	18	165	43	10	6	-	1	2	11	10	-	-
119	48	41	17	200	72	21	9	1	7	3	36	5	1	1/8
119	49	36	8	171	60	16	16	-	6	3	30	6	3	-
119	50	37	6	200	73	15	16	4	6	3	29	8	-	-
120	47	24	12	100	43	8	11	2	2	-	16	8	2	-
120	48	46	10	175	42	23	17	1	5	3	38	8	1	1/8
120	49	33	13	146	51	13	13	3	-	2	25	8	1	-
120	50	27	8	116	47	14	8	1	2	5	19	8	-	-
120	51	26	7	176	64	8	9	-	3	3	22	4	3	2 1/8
120	52	17	8	140	57	8	7	-	-	-	15	2	-	-
*120	51	11	10	191	72	2	6	-	1	1	6	5	-	-
*120	52	27	12	180	63	7	10	3	-	-	21	6	2	1/8
121	46	14	15	60	36	4	10	-	1	1	12	2	1	1/8
121	47	64	11	150	53	25	28	1	8	5	53	11	-	-
121	48	49	12	77	37	20	17	1	6	4	35	14	4	-
121	49	35	6	180	60	22	11	-	9	7	23	12	1	1/8
121	50	25	5	200	67	17	3	-	9	4	20	5	-	-
121	51	8	8	183	55	1	6	1	1	-	8	-	-	-
*121	51	26	15	180	55	9	13	3	1	2	22	4	-	-
*121	52	35	7	200	81	6	20	3	2	1	30	5	5	3/4
Total		736				316	284	29	93	69	575	161	28	4

* Indian Reservation

GRANT COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
118	48	3	230	250	237	1	2	-	1	-	3	-	-	-
118	49	2	230	256	243	1	1	-	1	1	2	-	-	-
119	47	1	-	-	287	-	-	1	1	1	1	-	-	-
119	48	2	215	289	252	-	1	1	-	-	2	-	-	-
119	50	1	-	-	374	-	1	-	1	-	1	-	-	-
120	47	1	-	-	280	-	-	1	-	-	1	-	-	-
120	48	1	-	-	220	-	-	1	-	-	1	-	-	-
120	49	4	327	466	388	-	-	3	3	-	2	2	-	-
120	50	4	230	263	245	2	1	1	1	1	4	-	-	-
120	51	4	260	455	370	2	2	-	-	-	4	-	-	-
120	52	2	325	575	450	1	1	-	-	-	2	-	-	-
*120	51	3	250	290	268	3	-	-	2	-	3	-	1	-
121	48	1	-	-	212	-	-	-	1	-	1	-	-	-
121	49	2	253	292	273	-	-	2	1	-	2	-	1	1/2
121	50	5	206	372	262	2	3	-	-	-	4	1	-	-
121	51	1	-	-	300	1	-	-	-	-	1	-	-	-
*121	51	5	250	497	322	4	1	-	-	-	5	-	1	1/8
*121	52	3	250	296	273	2	1	-	1	1	3	-	-	-
Total		45				18	14	10	13	4	42	3	3	5/8

* Indian Reservation

Note: No wells reported from the following townships and ranges for this group: T.118N., R.47,50W; T.119N.,R.49W; T.121N.,R.46,47,52W.

GRANT COUNTY
Table 3.
DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min	Number Con-trolled
118	47	7	38	175	86	1	6	-	2	-	7	-	1	1	17	-
118	48	7	46	180	79	5	1	-	1	-	5	2	1	1	3	2
118	49	1	-	-	68	1	-	-	1	-	1	-	-	-	4	-
119	48	1	-	-	110	-	1	-	1	-	1	-	-	-	1/8	-
119	49	5	4	70	58	2	3	-	1	-	5	-	-	-	3	1
119	50	5	23	170	106	-	5	-	-	-	5	-	1	5	3	-
120	48	2	20	24	22	2	-	-	1	-	2	-	-	-	-	-
120	49	5	22	370	107	1	2	1	1	-	4	1	-	-	1	-
120	50	6	52	562	308	1	3	2	1	1	5	1	-	-	3	-
120	51	1	-	-	-	-	1	-	-	-	1	-	-	-	-	-
*120	52	1	-	-	100	-	1	-	-	-	1	-	-	-	100	-
121	49	5	40	467	248	1	2	2	2	1	5	-	1	-	11/4	1
121	50	3	180	200	187	1	2	-	-	-	3	-	-	-	1/2	-
*121	51	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*121	51	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		49				15	27	5	11	2	45	4	4	7	-	4

* Indian Reservation Note: No wells reported from the following townships and ranges for this group: T.119N.,R.47W; T.120N.,R.47,52W; T.121N.,R.46,47,48,51W; T.118N.,R.50W.

GRANT COUNTY WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.118N., R.47W.
Sec. 18

115 feet:
"The well on my place is dug to a depth of 16 feet and is curbed with stone; from there on to a depth of 115 feet it is drilled and cased with a 2 inch pipe. Prior to 1937 when it was recased, it was only 40 feet deep. The difficulty in drilling well was to find sand coarse enough to get water out."

T.118N., R.49W.
Sec. 6

31 feet:
"Our well is not in a good location because in drilling for water we always got into a slate like substance which could not be penetrated."

T.118N., R.49W.
Sec. 18

10 feet:
"An attempt was made to drill well last year on higher ground but the well driller discontinued his efforts due to the composition of the soil which was mainly gravel and made progress very difficult if not impossible."

T.118N., R.49W.
Sec. 24

24 feet:
"Our well was drilled by myself in 1929, and the vein of water is in coarse sand and gravel, the water is quite hard but good to drink. The water level has not changed more than six inches in the dryest years. Well is located in house and piped to tank in yard for livestock."

T.119N., R.48W.
Sec. 10

39 feet:
"Well has lots of water but its bad."

T.119N., R.48W.
Sec. 23

24 feet:
"I have two wells on my farm, one at barn for stock (bored) 2½ in diam. and 24 feet deep. Another well at the house 6 inches in diam. cased with drain tile 24 ft. deep. Both have good water."

T.119N., R.48W.
Sec. 24

60 feet:
"Water is O K for stock but it isn't fit for human consumption."

T.119N., R.48W.
Sec. 10

110 feet:
"The wells water has a thin film of oil on it after standing. We had a well 40 ft. deep which came in with quite a pressure but did not come up to top."

T.120N., R.47W.
Sec. 4

71 feet:
"Well marked O furnished good water and plenty of it until sloughs went dry. The new well 71 ft. deep and dug by hand has a 3 ft. tile curbing, furnishes 6 barrels daily. Well marked X is fair water 12 ft. deep in coasse sand and pumped by windmill - cannot be pumped dry. At the house 9 wells have been dug down to 80 ft. - the bottom has blue clay."

T.120N., R.47W. Sec. 9	86 feet: "There has been trouble experienced because of hitting rocks before we reach water."
T.120N., R.49W. Sec. 10	327 feet: "It is necessary to go quite deep here in order to get water - no surface water here."
T.120N., R.49W. Sec. 15	14 feet: "Water on this farm is close to surface, however, some wells dug here have failed to give a good supply - this well has never gone dry."
T.120N., R.51W. Sec. 19	45 feet: "I have a drilled well on farm but is not in use now, it is 455 ft. deep and 230 ft. of pipe. I am not using it now because shallow well produces enough. It is in fine sand and produces plenty of water."
T.120N., R.51W. R. Sec. 15	180 feet: "There is 4 bored wells and one drilled well. I have trouble with quicksand."
T.120N., R.51W. R. Sec. 24	100 feet: "Dirt caves in just when we reach sand in bottom. There seems to be some wood or trees about 100 to 125 ft."
T.121N., R.46W. Sec. 17	16 feet: "Building site on granite ledge from 10 to 25 ft. below surface."
T.121N., R.47W. Sec. 12	48 feet: "This well is 78 ft. deep with very little water in it, the water is hard and rusts the pipes out in a short time."
T.121N., R.47W. Sec. 24	30 feet: "Bottom of well is very fine sand, probably quicksand, which cannot be kept back for cistern room."
T.121N., R.47W. Sec. 30	45 feet: "At two different places there was blue clay and another place had solid rock."
T.121N., R.48W. Sec. 4	30 feet: "This well has a small reservior but will pump all day long with a small stream. The water bitter tasting but has no ill effects. We have an old well in our shed that had good water but its all caved in."
T.121N., R.51W. R. Sec. 33	90 feet: "One well 90 feet deep bluish yellow sticky clay no water. A new well was tried about 40 ft. from this 63 ft. deep in coarse gravel with lots of water. In spring and summer 40 to 50 feet deep and in fall about 20 ft. of water. I have another well at 250 feet away from above mentioned, had lots of water but filled in with quicksand."

EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
of Agriculture and Mechanic Arts
Brookings, South Dakota

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of the South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. EBERLE, *Director*, U. S. Department of Agriculture cooperating.

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